CEHE

EHE-N TL PV Grid-connected Inverter

User Manual

Version: TL-EU-UME-V3.0

PV Grid-connected Inverter

EHE-N1K5TL

EHE-N2KTL

EHE-N3KTL

EHE-N4KTL

EHE-N4K6TL

User and Installation Manual

Version： V3.0:2012

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History of Versions

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1 Manual Instruction

1.1 Applicability

This manual includes the description regarding the troubleshooting in process of transportation, installation, maintenance and operation of the following EHE-N TL inverters:

- EHE-N1K5TL
- EHE-N2KTL
- EHE-N3KTL
- EHE-N4KTL
- EHE-N4K6TL

Please keep this manual in a convenient place for future reference.

1.2 Precautions

This manual is for qualified electricians. The tasks described in this manual may be performed by electrically qualified persons only.

1.3 Symbols Used

The following types of safety precautions and general information are used in this manual:

"Warning" indicates the matter that the user must strictly followed, otherwise, it may endanger the personal safety or cause damage to the property.

"Notice"indicates the important information for the user to optimize the PV system.

Symbols on the Inverter:

Symbol	Description
	DC
	AC
	Ground Protection
	Suggest of security considerations
	Beware of dangerous electrical voltage The inverter operates at high voltages. All work on the inverter may only be carried out by qualified personnel.
	Beware of hot surface The inverter can become hot during operation. Avoid contact during operation.
	CE mark The inverter complies with the requirements of the applicable EC guidelines.
	TUV mark The inverter complies with the requirements of the Equipment and Product Safety Act in Europe.

1.4 Tools Used in Inverter Installation

Inverter installation and wire installation will need the following tools,
You also can choose the right tools according to your own experience.

1、 Crimping plier
2、 Crimping plier
3、 Electric drill (Suggest specification: $\phi 8$)
4、 Socket wrench (Suggest specification: 14)
5、 Straight screwdriver (Suggest specification: M2)
6、 Cross screwdriver (Suggest specification: diameter 5)

2 Safety Instructions and Specifications

Please read this manual carefully before starting installation and operation. Any damage to the equipment caused due to failure to comply with the descriptions in this manual in installation or operation will be beyond the scope of the company's quality guarantee.

2.1 Safety Instructions

Warning！

- The EHE-N TL series PV grid-connected inverters can only be operated by qualified personnel.
- Do not touch the live components of the inverters when the inverter is in operation.
- Please pay attention to all the safety instructions listed in this manual.

Warning！

Make sure that the DC input voltage should never exceed 520V. Over higher voltage will cause damage to the device.

2.2 Specifications

The proper transportation, storage, assembly and installation as well as control and maintenance are required normally for safe operation.

Warning！

All operation and wiring works should be performed by professional electrical or mechanical engineers and all electrical installation shall be in accordance with the local electrical installation criteria.

To ensure safe operation, the equipment isrequired to be properly grounded, use correct size of conductors and provide necessary short-circuit protection.

Warning！

- 在
- Please use a multimeter to measure the DC side and AC side voltage without fail before inspection and maintenance to ensure that the operation is performed with no voltage at both DC and AC sides.

Warning！

- The solar cell arrays should be covered with opaque materials when installing the photovoltaic arrays during the day, otherwise the solar cell arrays will generate high voltage.

Notice!

The pictures in the manual are consult only, if deviate from the real object, according to the real object please.

Please follow all the indications related to dangers, warnings and safety according to the requirements for operation and installation descriptions.

3 The Introduction of EHE-N TL Series PV Inverters

The EHE-N TL series inverter is grid-connected inverter of high conversion efficiency without transformer. The EHE-N TL series grid-connected inverter enables maximum power output of solar panels and can convert and supply the output energy of solar panel to the power grid.

3.1 Introduction of Product

The PV grid-connected generation system consists of PV arrays, grid-connected inverter, metering devices and distribution system (as shown in Fig. 3-1). The solar energy is converted into DC energy through solar cell array and then the DC energy is converted into sinusoidal wave AC voltage of the same frequency and phase with that of the grid, of which a part supplies power to the local load and the rest of the power is fed to the grid.

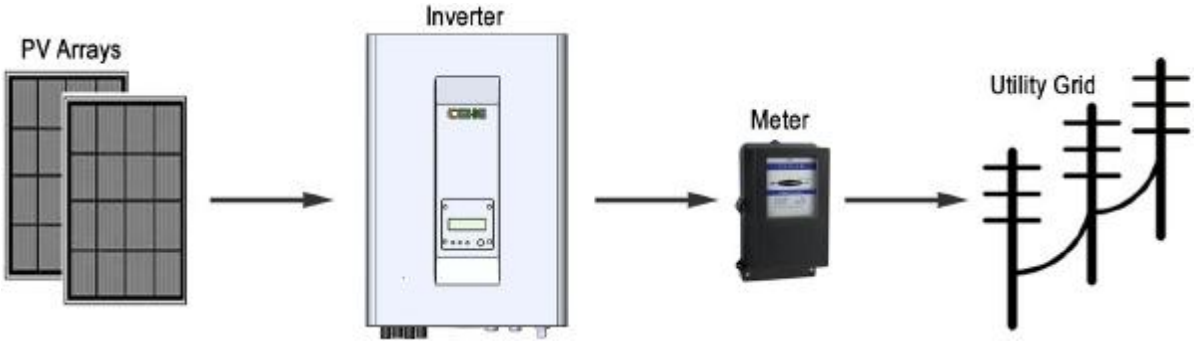


Fig. 3-1 PV Grid-connected system

Notice!

The PV grid-connected generation should start with permission from the local utility department and invite the professional personnel to perform the relevant operations.

3.2 Features of EHE-N TL Series PV Inverters

- Adopt advanced IGBT power module.
- High conversion efficiency; low temperature rise; low noise; long lifespan.
- MPPT>99.9%.
- Advanced multi-languages LCD display and powerful communication interfaces.
- Intergrated DC isolation switch(optional).
- Extended MPP voltage range.
- Advanced anti-islanding technology.
- Perfect system protection, high reliability.
- Moudular design, easy to install, operate, maintain.

4 Structure of EHE-N TL Series Circuit

Fig. 4-1 and Fig. 4-2 are block diagrams for internal functions of an EHE-N TL series inverter. MPP tracker to ensure that maximum power from PV arrays can be utilized. DC switch can cut input of the PV arrays. Boost circuit raises input DC voltage. Then H4 full bridge inverter circuit converts DC power to AC power. Meanwhile inverter is equipped with protective circuit to guarantee itself safely operation that can trigger AC relay if required.

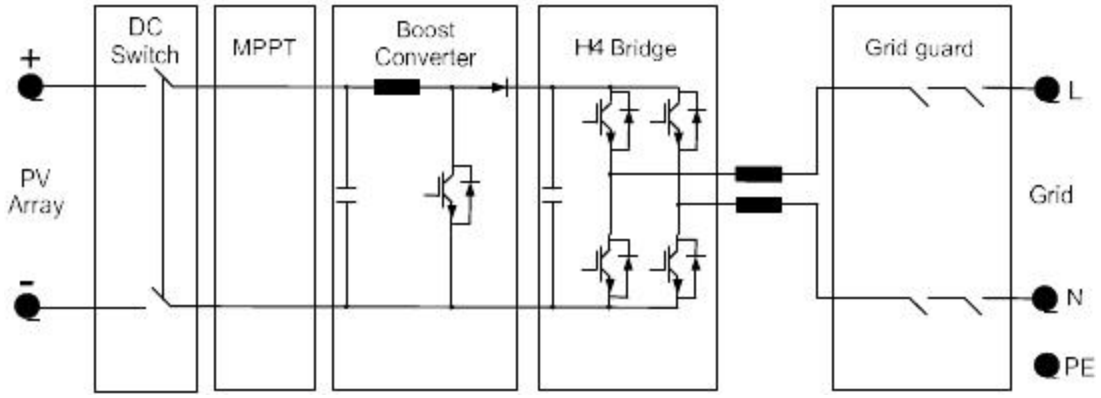


Fig. 4-1 Schematic diagram of EHE-N1K5TL/EHE-N2KTL

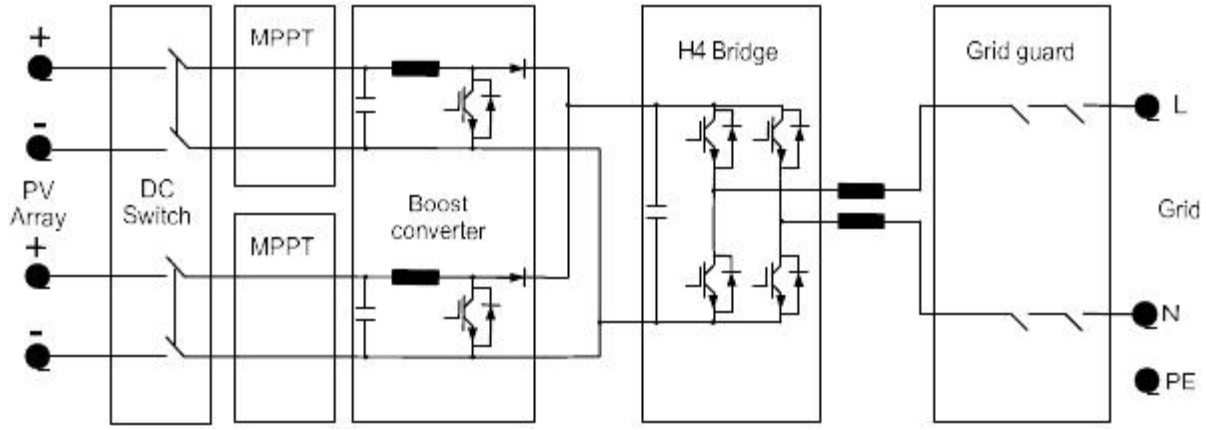


Fig. 4-2 Schematic diagram of EHE-N3KTL/EHE-N4KTL/EHE-N4K6TL

5 Installation

5.1 Safety Instructions

The installation, operation and maintenance of EHE-N TL series inveters must be carried out strictly according to the following specifications and instructions:

- Check the inverter carefully first for damage during transportation, if any problem is found, please contact Anhui EHE New Energy Tech. Co., Ltd. or the transportation company.
- The inverter grid-connected power generation should start with permission from the local utility department and the relevant operations should be carried out by professional personnel.
- All electrical connections must be in accordance with local electrical installation criteria.
- Don’t touch other parts in the cabinet except the connecting terminals in installation.
- Make sure that, the circuit breakers at both DC and AC sides are in open state before carrying out electrical connection.
- Make sure that the circuit breakers at both DC and AC sides are open. At least 5 minutes later, use a multimeter to measure the voltage at DC and AC sides before carrying out equipment maintenance to ensure that the maintenance must be conducted with no voltage at both DC and AC sides.

5.2 Installation Preparation

5.2.1 Inspection before Installation

The product has been tested and checked carefully before transportation, but damage may be caused during transportation, therefore, the product should also be checked carefully before installation. If any damage is found, please contact EHE or the transportation company.
Please keep well the photos taken at the damaged parts and we'll provide you with best and fastest services.

5.2.2 Requirement for Installation Conditions

Warning！

The temperature will be increasing when the inverter is operating properly, therefore, do not install the inverter at a flammable or explosive place or a place where the flammable or explosive materials are stored.
Do not install the inverter in a place where there is a risk of explosion.

- The inverter of IP65 protection class can be installed outdoor.
- Do not install the inverter in a place exposed to direct sunlight, otherwise, it may lead to higher temperature in the inverter resulting in derated operation, even overhigh temperature resulting in inverter temperature fault.
- The installation place selected should be solid enough to support the inverter weight for a long period.
- The site for inverter installation must be clean and the ambient temperature must be maintained within -25 to +60 °C.
- The inverter must be installed in a place convenient for observation and maintenance.
- Tne inverter uses natural cooling mode and the installation site selected should ensure the minimum installation spacing between the inverter and the fixed object and the nearby inverters to ensure an good ventilation.

Direction	minimum spacing
above	60cm
below	50cm
sides	40cm

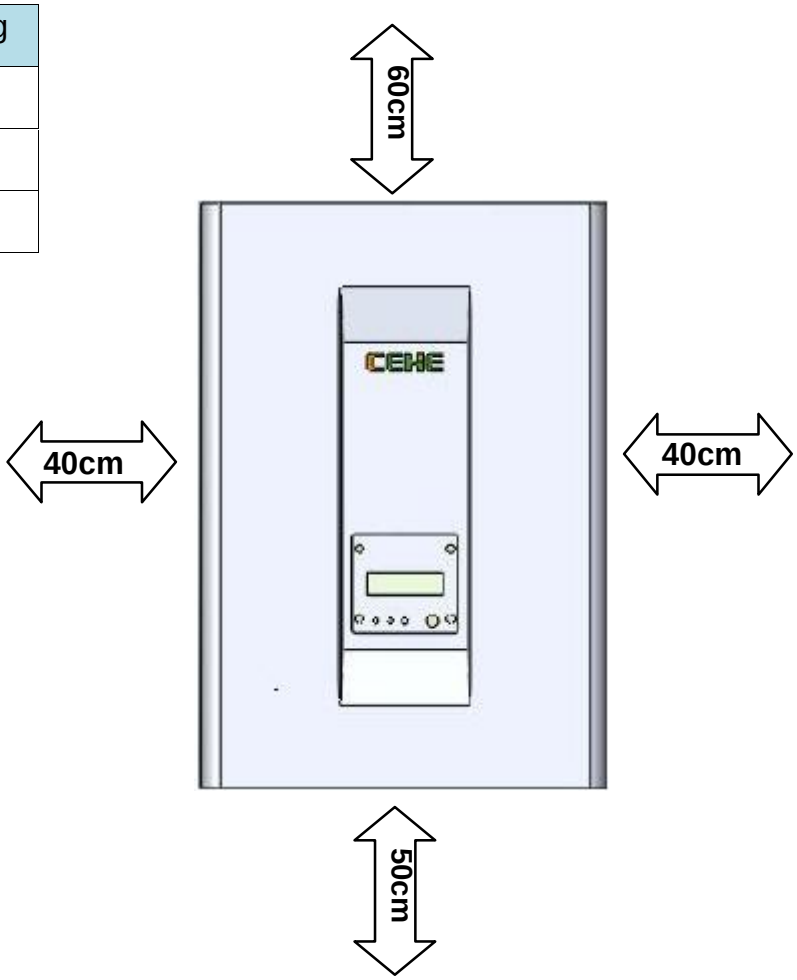


Fig. 5-1 Minimum spacing of adjuscent installations

Warning！

The installation of EHE-N TL series inveter in a higher salt spray environment is prohibited.

5.2.3 Installation Direction

1. The inverter should be installed vertically or titled backwards with a maximum angle of 10°.
2. Do not install inverter tilted forwards.
3. Never install the inverter horizontally.
4. The installation height of inverter should be convenient for operation and reading out of the LCD displayed information.

Fig. 5-2 Installation directions

5. 3 Installation of Inverter

1. Drill holes in the selected installation position according to the size and shape of sheet metal for installation of accessories. See the Fig. below for an installation example. When drilling, please drill at least two horizontal holes and two vertical holes, and the distance between two vertical holes should be at least 100mm.
2. The suggesting diameter of hole is 8+1/-0, the depth is 60+5/-0. When drilling, keep the drill vertically to the wall without shaking to avoid the holes tilting.

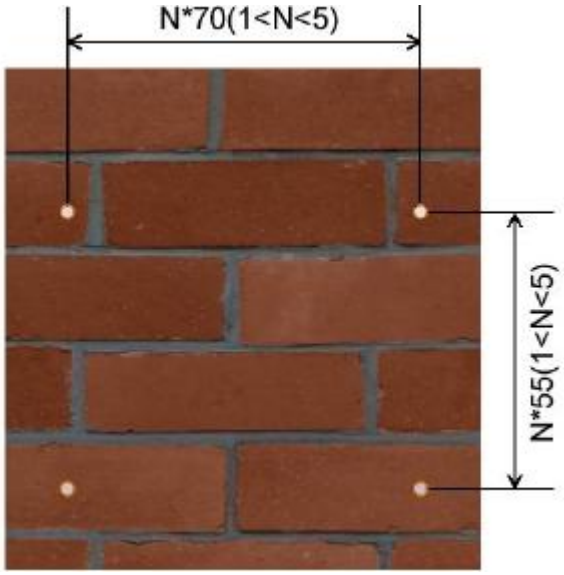


Fig. 5-3 Installation holes of EHE-N1K5TL/EHE-N2KTL

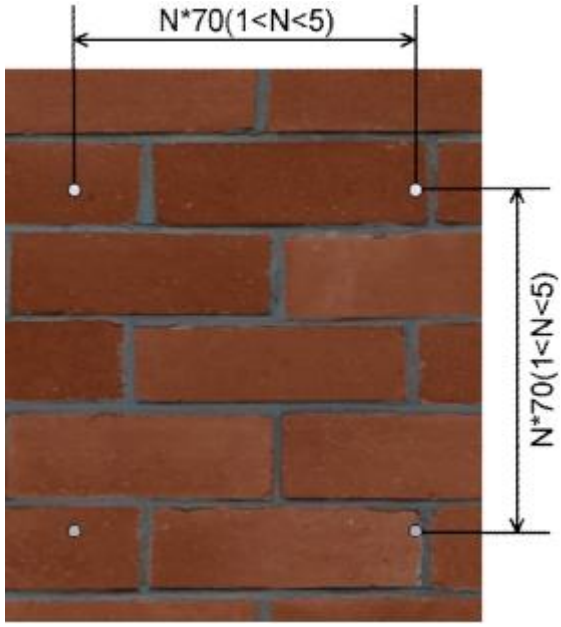


Fig. 5-4 Installation holes of EHE-N3KTL/EHE-N4KTL/EHE-N4K6TL

3. Fix installation sheet metal in the located holes with bolts.

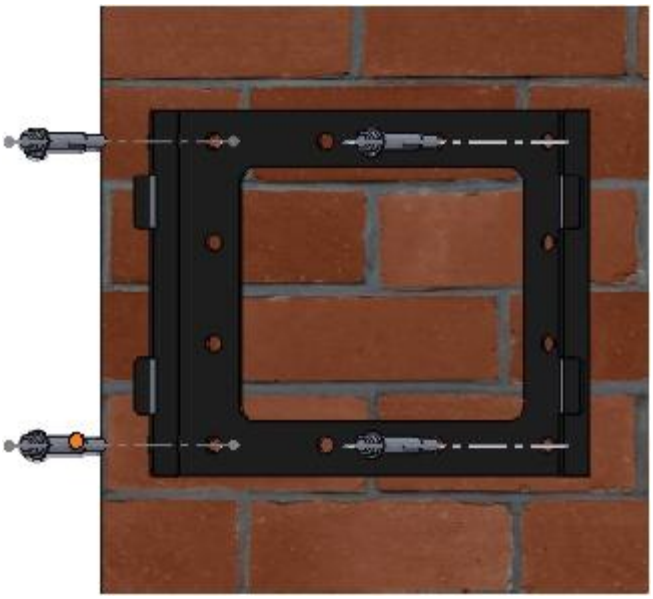


Fig. 5-5 Installation of bolts

4. Lock down the bolts, make the bolts cling to the wall.

Fig. 5-6 Effect of Installation the bolts

5. Hang the inverter onto the installation sheet metal.

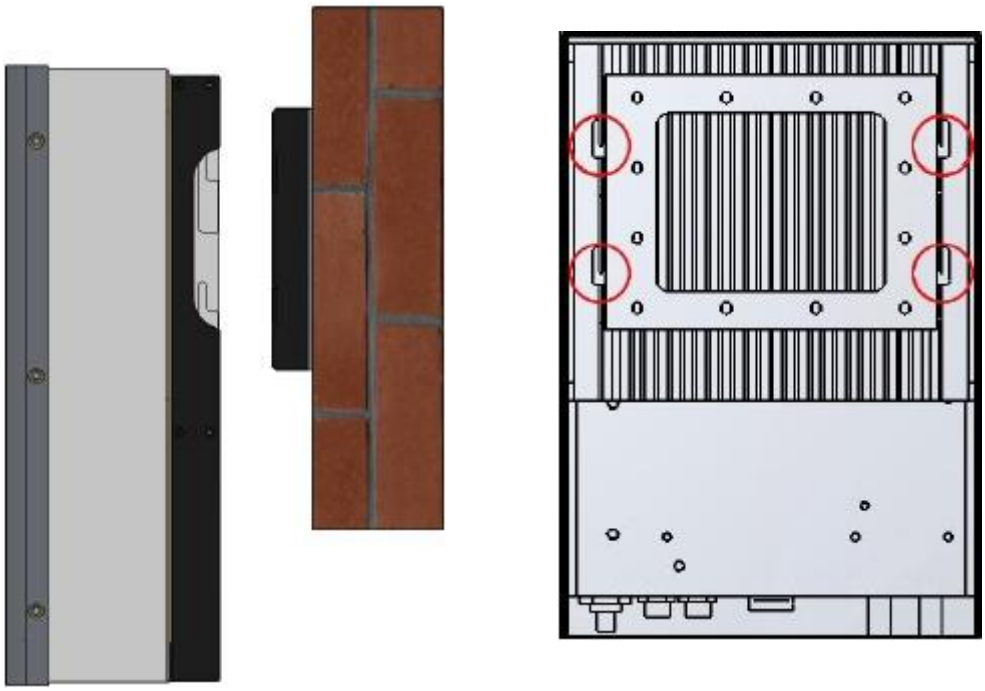


Fig. 5-7 Installation of the EHE-N TL

Notice!

Fix the inverter on the rock or panel with the toggle bolt or screw is not permitted.

Notice!

Anhui EHE would provide the bolt which suitable for the installation on the concrete wall. If the inverter is fixed on the wooden wall, please choose suitable bolt to finish the installation, the bolt length should be enough and penetrate the 1/2 depth of the walls.

6 Electrical Connection and Commissioning

The electrical connection should be carried out immediately when the installation is completed. When making electrical connection, special attention should be paied to the following operating specifications:

Warning！

Any improper operation and installation may cause fatal injury to operator. Only qualified electrical personnel can perform the wiring installation work.

- Before electrical connection, please make sure that the AC side
- and DC side are uncharged.
  The PV array open-circuit voltage set should not exceed 520V!

Notice!

The inverter can start grid-connected operation only when the local utility department approved and the professional electrical personnel completed the installation and electrical connection. All electrical installations must be in accordance with local and national electrical codes.

Notice!

- The wires and cables of appropriate size must be selected and firmly connected and well insulated.

Warning！

Do not switch on any breakers until the PV generator has been connected and all of the devices have been fixed.

warning！

Do not plug in or out any connectors when the inverter is charged.

6.1 Electrical Connection Steps

Fig. 6-1 and Fig. 6-2 show the electrical connections between grid-connected inverter EHE-N TL and solar cell array as well as grid.
User must add a DC circuit breaker at the input side of inverter; add an AC circuit breaker at the output side of inverter. And the requirement models of breakers as Table 6-1. Because of the inverter has with DC switch itself, if the distance between solar cell array and inverter is short, you also can not add DC circuit breaker.

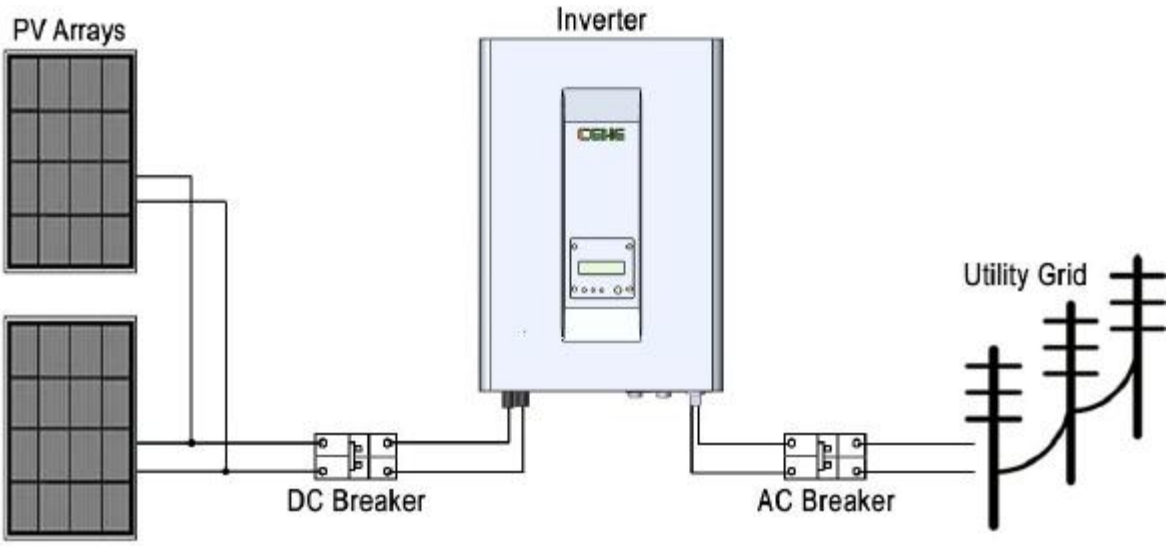


Fig. 6-1 Schematic diagram of electrical connection of EHE-N1K5TL/ EHE-N2KTL

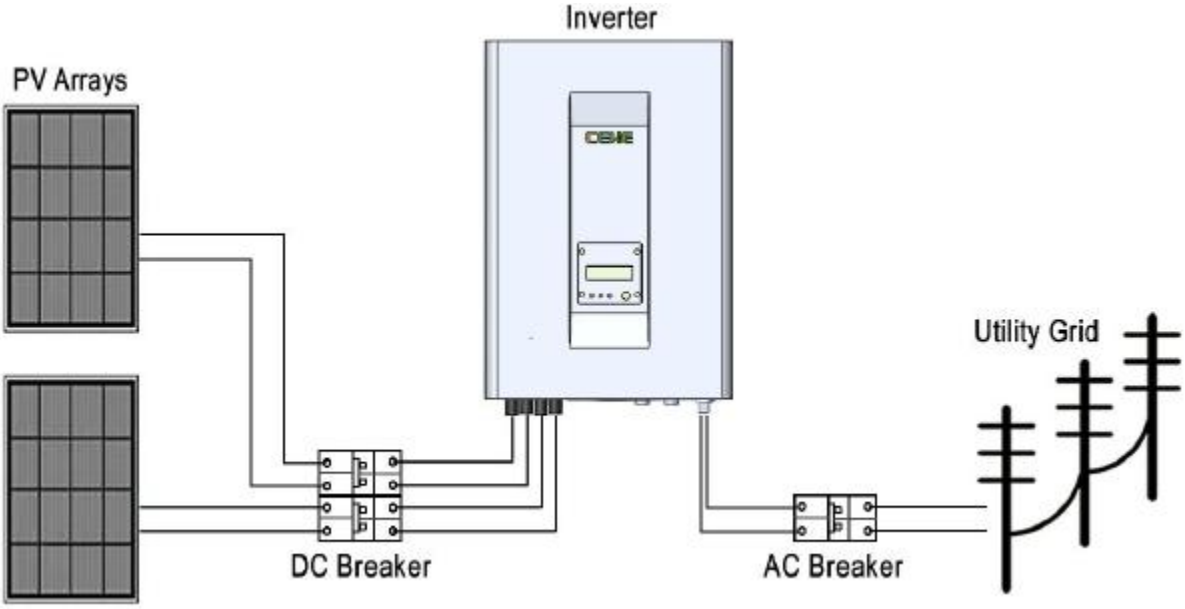


Fig. 6-2 Schematic diagram of electrical connection of EHE-N3KTL/ EHE-N4KTL/EHE-N4K6TL

Table 6-1 Requirement for Selection of Circuit Breakers

Breakers	Requirement model				
	EHE-N1K5KTL	EHE-N2KTL	EHE-N3KTL	EHE-N4KTL	EHE-N4K6TL
DC Breaker	600VDC,16A 2poil	600VDC,16A 2poil	600VDC,16A 4poil	600VDC,16A 4poil	600VDC,16A 4poil
AC Breaker	400VAC,16A	400VAC,20A	400VAC,25A	400VAC,25A	400VAC,25A

6.2 Connecting Terminals at Bottom of Inverter

The input and output terminals are installed in the bottom of the inverter and include DC side input terminals and AC side output terminals, and RS485 communication terminals.

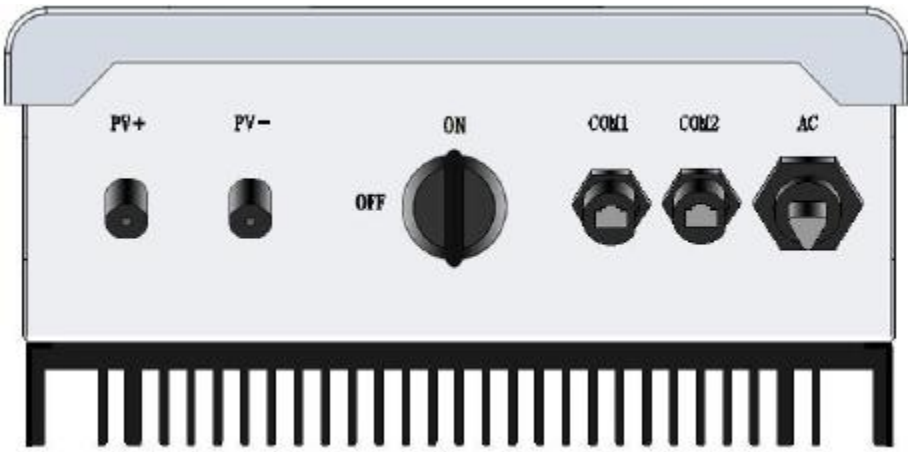


Fig. 6-3 Connection terminals at bottom of EHE-N1K5TL/2KTLInverter

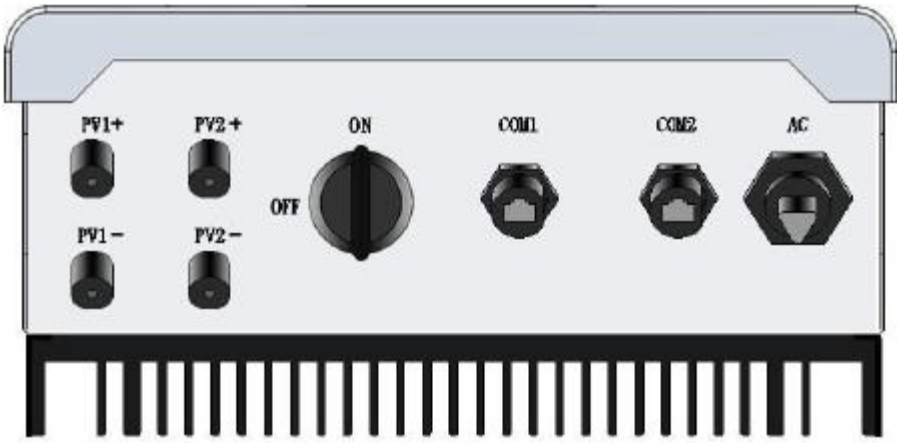


Fig. 6-4 Connection terminals at bottom of EHE-N3KTL/4KTL/4K6TLInverter

Table6-2 Terminals Description

Terminals	Description
PV+/PV1+/ PV2+	PV array DC positive input terminals, connect with power grid by DC breaker
PV-/PV1-/ PV2-	PV array DC negative input terminals, connect with power grid by DC breaker
AC	AC output terminals, connect with power grid by AC breaker
ON	DC switch is ON
OFF	DC switch is OFF
COM1	WiFi /RS485communication interface(optional)
COM2	Reserve

6.3 Selection of Cables for Electrical Connection

The user can select cables used for electrical connection according to the following specifications.

Table 6-3 Specifications of Cables for Electrical Connection

Wire	Requirements（ AWG）				
	EHE-N1K5TL	EHE-N2KTL	EHE-N3KTL	EHE-N4KTL	EHE-N4K6TL
DC positive input cable	12	12	12	12	12
DC negative input cable	12	12	12	12	12
GND wire	12	12	12	12	12
Grid L wire	12	12	12	12	12
Grid N wire	12	12	12	12	12

6.4 Grid Side Electrical Connection

6.4.1 Consideration for Grid Side Electrical Connection

You must install a separate line circuit breaker for each inverter in order to ensure that the inverter can be securely disconnected under load.
And the requirement models of breakers as Table 6-1.

Warning！

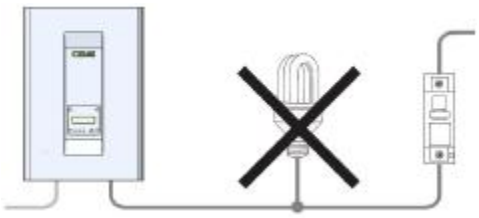
When more than one inverter is connected to the same line circuit breaker, the protective function of the line circuit breaker is no longer guaranteed. It can result in a cable fire or the destruction of the inverter.

- Never connect several inverters to the same line circuit breaker.

Warning！

When a producer (inverter) and a consumer are connected to the same line circuit breaker, the protective function of the line circuit breaker is no longer guaranteed. The current from the inverter and the grid can accumulate to overcurrent which is not be detected by the line circuit breaker.

· Never connect consumers between the inverter and the line circuit breaker without protection.
· Always protect consumers separately.



6.4.2 Connect Inverter to Grid

1、Connecting of the wire of the Connector:

Please connect the wire of the AC Connector according to the following steps:

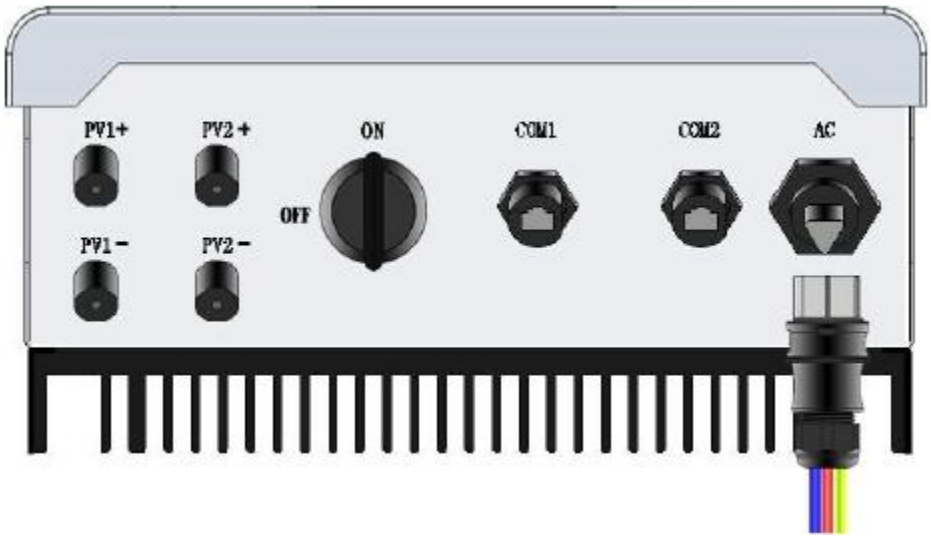
Operation Instruction	Operation Demonstration
Step 1: Using the straight screwdriver to separate the connector jacket and the wire body.	
Step 2: Losing the fastening nut at the jacket bottom.	
Step 3: Strip off the insulation from the 3 wires: L, N, GND. The length of stripped insulation is approximate 7mm. Plug the wire through nut and intermediate leave.	
Step 4: Plug the L, N wires into the L, N holes in the connector, the GND into the hole with mark" ⏚ ", and then tighten the screws. Remember the colors corresponding to different wires.	

Step 5: Connect the intermediate sleeve and front-end wiring slots and tighten the nut in the direction opposite to that in step 1.	
The impression drawing	

2、Making sure that the grid voltage is in the permitted voltage rage (185-260Va.c.).

3、 Making sure that AC-side circuit breaker is in open state.

4、 Plug the AC connector into the AC-side terminal at the bottom of the inverter, untile a sound indicating inseted in place is heared（ Take EHE-N3KTL for example） .



5、 Connect the cables between AC circuit breaker and the grid.

Notice!

The PE connection is adopted inside the inverter, making the machine jacket and the cover are grounded.

6.5 DC Side Connection Steps

Warning！

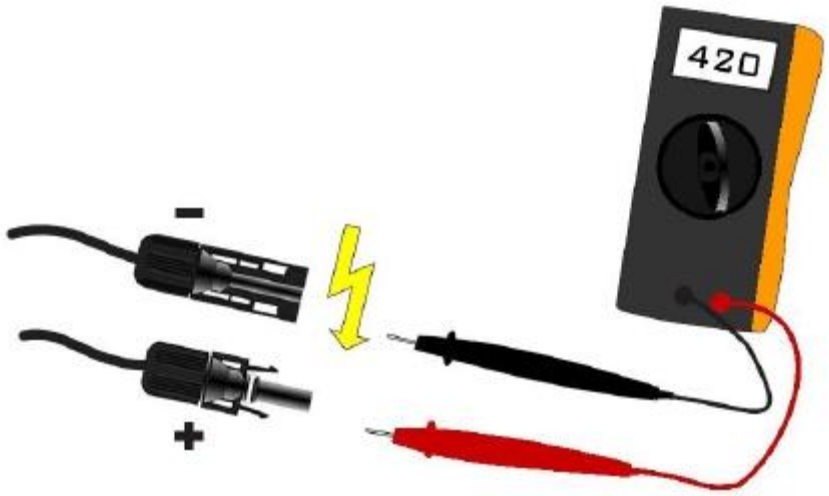
When carrying out connection of PV array and inverter, the PV array should be covered with transparent materials and the DC-side circuit-breaker should be disconnected, otherwise, the PV array may generate dangerous voltage.

Notice!

- Make sure that the DC input voltage of the inverter should not exceed 520V!
  For two-input inverter, the selection of cables of the same sectional area is required to ensure that the balance between DC input groups is kept.

6.5.1 Connecting Inverter to PV Array

1、 Measuring the PV array's positive and negative in multimeter, make the polarity is correct. Moreover, make sure the PV array voltage doesn't exceed the maximum input voltage (520V).



Notice!

If the machine damaged because that PV array voltage exceeds maximum DC input voltage of the inverter, it doesn't belong to warranty range.

- Do not connect the PV array, of which the open-circuit voltage exceeds maximum DC input voltage to the inverter.
- Inspect every system carefully before installation.

2、 Connecting of the wire of the Connector.

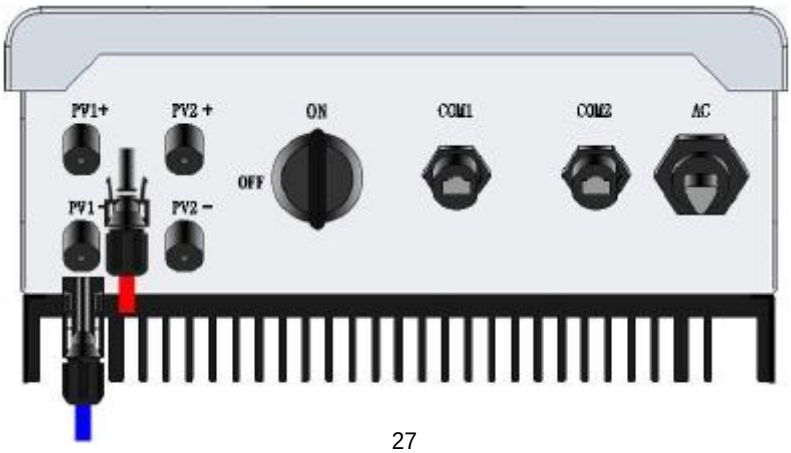
Please connect the wire of the DC Connector according to the following steps:

Operation Instruction	Operation Demonstration
Crimping plier	
Step 1: Unscrew the fastening nuts from the connector.	
Step 2: Strip off the insulation from the DC cable, The length of stripped insulation is approximate 7mm.	
Step 3: Crimp the exposed core part to the connector tube core with crimping pliers.	

Crimping effect figure	
Step 4: Plug cable with tube core part through the fastening nut.	
Step 5: Plug the tube core into the wiring trough untile a sound indicating inseted in place is heared. Tighten the nut in a direction opposite to that in step 1.	
Effect figure	

3、 Make sure that the positive and negative pole of PV array is connected rightly.

4、 Make sure that the DC-side switch and DC-side circuit breaker are in open state, plug the positive and negative connector into the corresponding terminal at the bottom of the inverter respectively. Note that he positive and the negative mustn't be misconnected （ Take EHE-N3KTL for example） .



5、 Plug the other input connectors into the corresponding inverter terminals in the same way.

Notice!

EHE-N1K5TL/EHE-N2KTL inverter has one PV array input.
EHE-N3KTL/EHE-N4KTL/EHE-N4K6TL inverter has two string PV inputs. The system supports simultaneous connection of two groups of PV arrays of the same power.
The power of each string of PV array for EHE-N3KTL inverter shall not exceed 1.65KW.
The power of each string of PV array for EHE-N4KTL inverter shall not exceed 2.2KW.
The power of each string of PV array for EHE-N4K6TL inverter shall not exceed 2.53KW.

6.5.2 Inverter Input Parallel Connection

EHE-N3KTL/EHE-N4KTL/EHE-N4K6TL Inverter has two strings PV array input. System supports input of the two groups PV array which are in the same frequency.
But some systems may feature a single array. When this is the case, the array may be connected to the No.1 DC input PV1 section alone provided that array current is less than the maximum capacity of one section. To avoid possible problems when determining panel electric insulation parameters, short the inputs PV1 and PV2.

1、Parallel method of Inverter internal

Parallel method of Inverter internal, just is short the inputs of the second section (PV2) by connecting a cable to the suitable terminals on the inverter board. First remove the cover panel of the inverter. How to remove the panel can refer to “7.2 The Installation and Backout of Cover Panel”.
After remove the cover panel you can find the PV1+、PV1-、PV2+、PV2- terminals on the main PCB board as Fig. 6-5. Short the PV1+ and PV2+ terminals with suitable wires, and short the PV1- and PV2- terminals in the same way, as Fig. 6-5.

Fig. 6-5 Effect of inverter internal parallel

2、Parallel method of Inverter external

Parallel method of Inverter external, then need to select a photovoltaic connectors as Fig. 6-6.

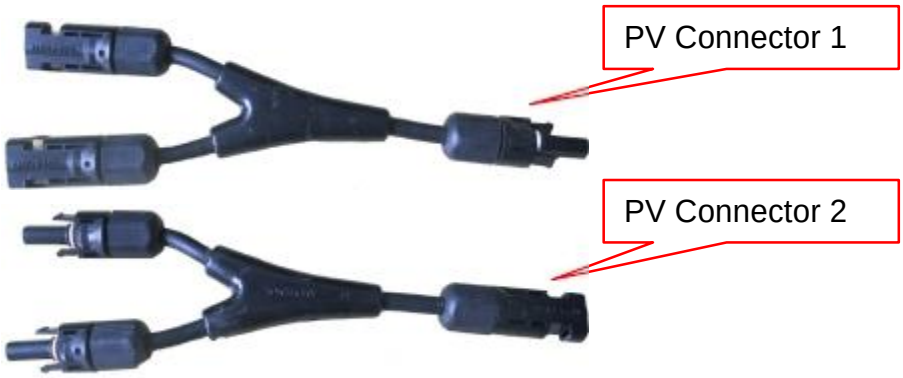


Fig. 6-6 photovoltaic connectors

Then connect the photovoltaic connector 2 to PV1+ and PV2+ of inverter, and connect the photovoltaic connector 1 to PV1- and PV2- of inverter, as Fig. 6-7.

Fig. 6-7 Effect of inverter external parallel

Notice!

EHE-N1K5TL/EHE-N2KTL Inverter has one string PV array input, no need to perform short circuit.

EHE-N3KTL/EHE-N4KTL/EHE-N4K6TL Inverter have two strings PV array input, can make them short circuited in parallel. We recommend you select the “Parallel method of Inverter external” to parallel connect in order to easy operation.

6.6 Communication Connection

When the inverter worked as stand alone communication, the connection between the inverter and the monitoring equipment can be performed by means of RJ45 connector.
There are 2 routes connecting holes located at the external of the inverter. It does not matter whether it is no.1 or no. 2 inputing wiring connected to the RJ45 connector considering that they are connected in parallel. Outputing wiring connected to the monitoring equipment (computer).

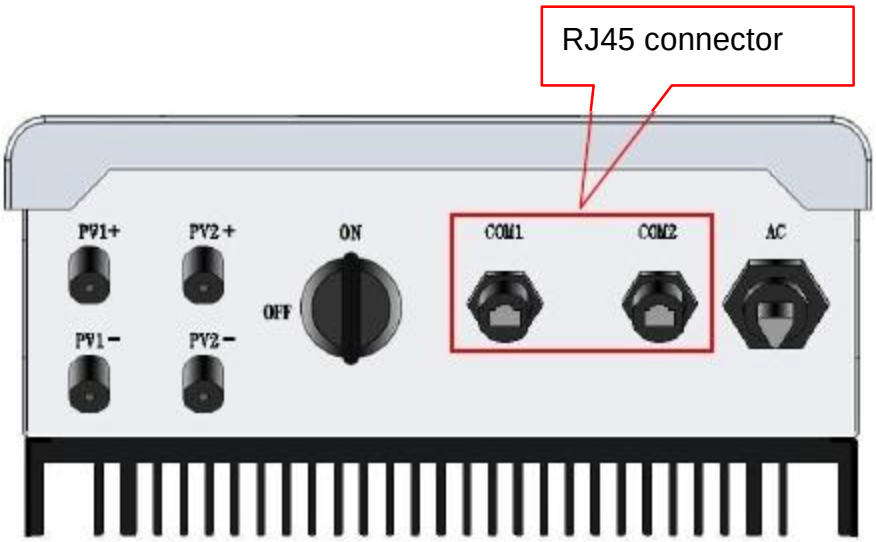


Fig. 6-8 RJ45 Connector

6.6.1 RJ45 Connector Wiring

Description of the RJ45 connectors pin# on the panel showing as below:

Table 6-4 RJ45 connector

	Pin #	Signal Name	Description
	1	VCC	The positive polarity of WiFi modular.
	2		Not Used
	3		Not Used
	4	A	Required for RS485 communication.
	5	B	Required for RS485 communication.
	6		Not Used
	7		Not Used
	8	GND	The negative polarity of WiFi modular.

Notice!

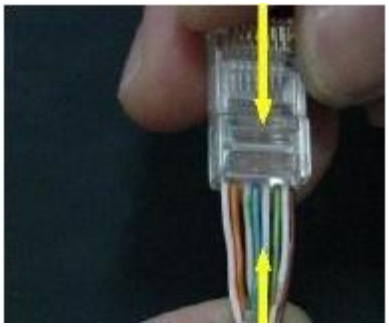
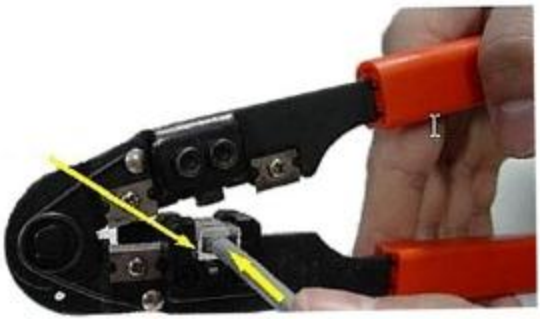
To make sure the communication quality, the communicating cable should the shielding wire. Sub-thread has weak anti-interference capacity, will result in the communication work abnormally when the machine is disturbed.

For convenience, we suggest you buy the finished network cable as the communication connector. Follow step2 to step 4, connect the PIN 4 and PIN 5 of crystal head to communication interface A and B of the RS485. If you want to make the communication connector yourself, please follow the step1 to 4.

1. Processing of the connector wire

Please crimping the RJ45 first crystal wire as following:

Operation Instruction	Operation Demonstration
Crimping plier	
Step 1: Pull out the wire	
Step 2: Put the wire in order	

Step 3: Cut off the wire	
Step 4: Insert the wire into the first crystal in order	
Step 5: Ready to compact	
Step 6: Compressed	
Effect figure	

2、 Make the wire crimped with the first crystal through the waterproof terminal.

3、 Insert the connector into the corresponding connector on the inverter, fastening the nut

4、Refer to the description of the RJ45 pin, select the corresponding wires connect to the corresponding A, B communication.

6.6.2 Multicomputer Communication

RJ45 connectors can be used to connect a single inverter or many inverters connected in a daisy chain. Maximum number of inverters that can be connected in daisy chain is 255. Recommended maximum length of this chain is 1200 metres.

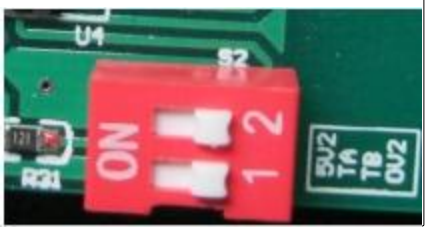
In case many inverters are connected in a daisy chain, it is necessary to assign an address to each unit. Please reference the document of **User Manual of Solar Power Management System** for how to set addresses.

Notice!

Any device is supplied with default address "10".

Notice!

Any device delivered with the “1” and “2” of S2 dip switch in the “OFF” position.



When we perform the Multicomputer communication, we should make the "1”and “2” of S2 dip switch, which is in the LCD panel of the last unit in the ON position, the "1”and “2” of S2 dip switches, which are in the LCD panel of the rest units in the OFF position. The 7.2 cover panel’s disassembling and installation show you how to open the machine cover.

The following diagram shows you how to connect many multiple units in daisy chain configuration.

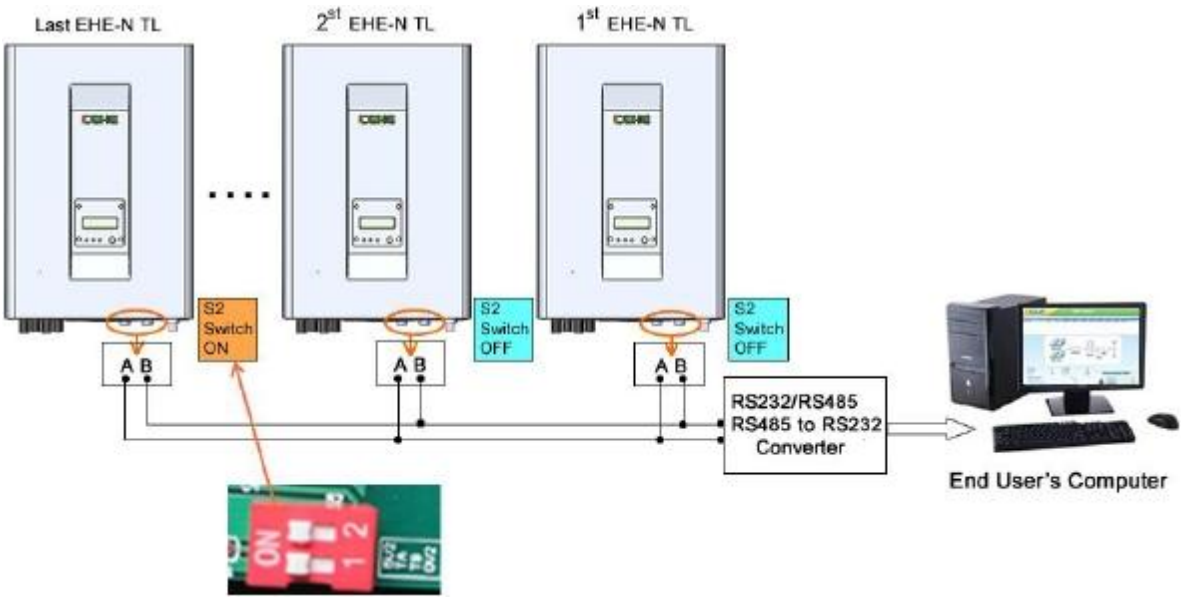


Fig. 6-9 Multicomputer communication

Notice!

Multicomputer communication is optional. If do not need it, we will use an end cap to close “COM1” up, and install RJ45 as an alternative.

6.6.3 WiFi Communication

EHE-N TL Inverters with WiFi function, how to use please refer to the “**WiEi Communication Module User Manual**”.

6.7 Inverters with Three Inverters Per Phase

Example for the thermal rating for a line circuit breaker in a photovoltaic power-generating system operated in parallel with the low-voltage grid. We assume a PV system with 9 EHE-N TL inverters, with three inverters per phase, as the Fig. 6-10 below.

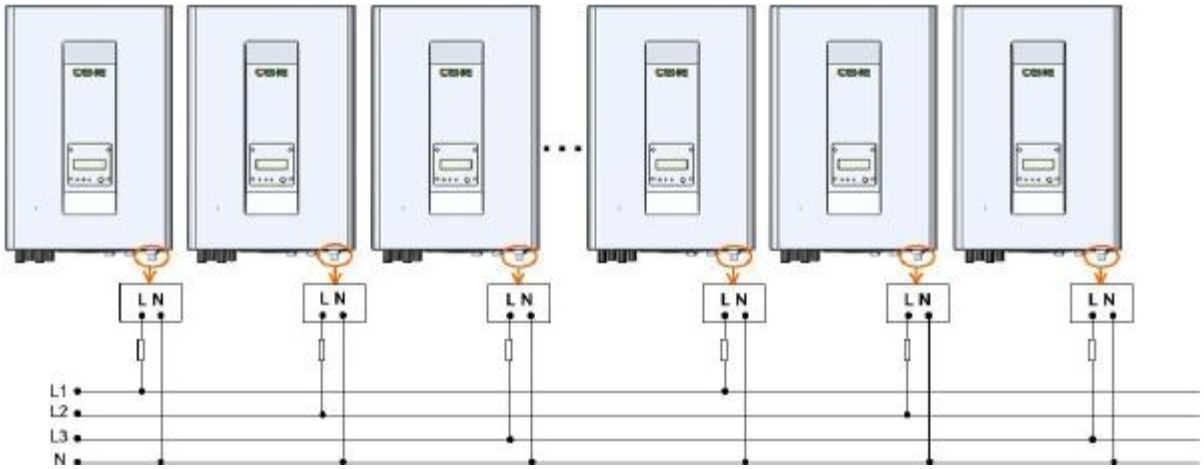


Fig. 6-10 Three inverters per phase

Required technical information for the inverters used.
1. Maximum output current as table 6-5.
2. Maximum permissible fuse protection for the inverter as table 6-6.

Table 6-5 Maximum output current

Requirements				
EHE-N1K5TL	EHE-N2KTL	EHE-N3KTL	EHE-N4KTL	EHE-N4K6TL
6.9A	10A	15A	20A	23A

Table 6-6 Maximum permissible fuse

Requirements				
EHE-N1K5TL	EHE-N2KTL	EHE-N3KTL	EHE-N4KTL	EHE-N4K6TL
16A	15A	25A	32A	32A

6.8 Commissioning

6.8.1 Verify before Commissioning

PV arrays

The PV array should be checked before operation of the inverter to ensure that the positive and negative mustn't be misconnect, otherwise, the damage may be caused to the inverter. Make sure that the open-circuit voltage of photovoltaic array doesn't exceed the required voltage.

DC input

Make sure that the DC terminals of the inverter are connected correctly and maintained consistent with the PV array.

AC output

Make sure that the AC-side of inverter is connected correctly to ensure that the AC-side circuit breakers of the inverter are in open state.

6.8.2 Inverter Commissioning

After electrical connection, accord to the following steps, start EHE-N TL PV inverters.

- Make sure that DC and AC voltage of inverter are in permitted range.
- Make sure that the inverter is connected correctly to the grid.
- Make sure that the polarity of PV arrays is correct.
- Make sure that the AC and DC terminals are connected firmly.
- Switch on the AC-side circuit breakers.
- Switch on the DC switch on the Inverter，then switch on the DC-side circuit breakers.

After the above steps are completed, when the grid normal and DC-side voltages are higher than 180V, the inverter shall start operating automatically.

Warning！

Please first switch on the AC-side circuit breakers, then switch on the DC switch on the Inverter，at last switch on the DC-side circuit breakers, or may result in equipment damage.

7 Disassembling and Installation

7.1 Safety Instruction

Warning！

Before open the inverter, please pay attention to the following:

- Making the AC-side and DC-side circuit breakers are in open state.
- Waiting for a few minutes to making sure the inverter is uncharged.

Warning！

If the inverter has equipped the DC-side switch, please make it switch on before inserting and pulling out of the DC-side connector.

Warning！

When the inverter is in a state of charged, please don’t insert and pull out of any connector. Otherwise, it will cause the personal injury and equipment damage.

Notice!

Electrostatic discharging will cause damage to the inner parts of the inverter. We should carry out the antistatic measure before disassembling and installation.

7.2 The Installation and Backout of Cover Panel

Because of repair or any other reasons, need disassemble inverter cover, for the better seal performanc, make sure that you are operating according to the following instruction.

1、When disassemble inverter cover, use the cross screwdriver, screw the cover screw in turn, and then disengage the grounding wire from the grounding screw of the inverter cover.

2、 When installation, first installation the grounding wire to the grounding screw of the cover. Then installation cover, use the cross screwdriver, the torque is 1.8±0.2N·M, lock the cover screw in turn.

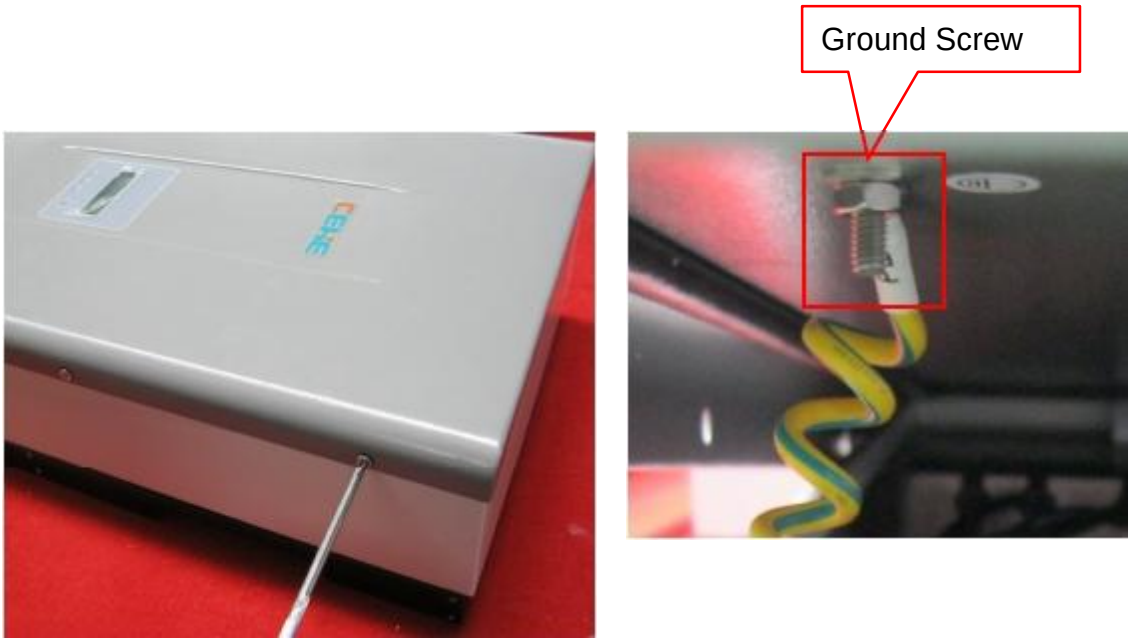


Fig.7-1 The reference picture of Installation and disassembly

7.3 The Disassembling and Installation of Connector

The Disassembling and Installation of PV connector

The professional tool, which is designed specifically for the DC side PV Connector, are necessary if the connected PV Connector need to be removed, as it can help to pull out the connected PV connectors easily.

Please operate as following :

Operation instructions	Demonstration picture
Professional tool for PV Connector	
Step 1: Putting the professional tools into the holes of the PV connector totally, as shown on the picture, the connectors are disengaged.	
Step 2： Remove the connector.	

AC Side Electrical Connection

The AC side connectors need to be removed by screwdriver.
Please operate as following:

Operation instructions	Demonstration picture
Straight screwdriver	
Step 1： Inserting the straight screwdriver into the hole as shown on the picture so that the connectors are disengaged.	
Step 2： Remove the connector.	

Communication Connection Steps

No professional tools required. Just unscrew the connector as shown on the picture.

Operation instructions	Demonstration picture
Step 1: Unscrew the nut as shown on the picture.	
Step 2： Remove the connector.	

8 Man-Machine Exchange System

8.1 LCD Panel

The LCD panel of EHE-N TL series inverter is composed of the LCD screen, LED lights and a button, and the system can be easily monitored, as shown in Fig. 8-1.

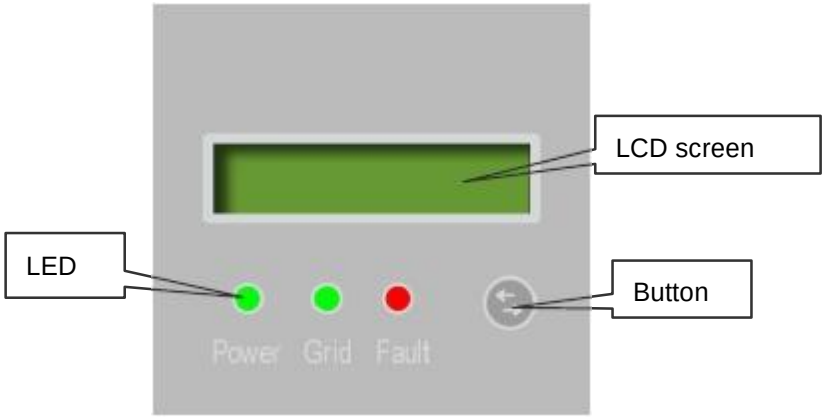


Fig. 8-1 LCD panel

The EHE-N TL series inverter is characterized by high degree of intelligentization that can start and stop operating everyday automatically without manual control. There are 3 LED lights in the LCD panel (as shown in Fig. 8-1) that tell us the operating states of inverter. The states indicated by each LED light are as listed in the following table.

Table 8-1 Description of LED Lights

LED Light	Color	Description
Power	Green	Power indicator light comes on (It comes on when LCD panel supplies power)
Running	Green	Grid-Connected Running light (The indicator light comes on when it runs normally)
Fault	Red	Fault light (It comes on when a fault occurs and not removed)

The indicators are described in detail as follows:

1） The power indicator light (green) shall come on when supplying power.

2） The three indicator lights shall come on simultaneously when the system is initializing and the master chip is operating, and the fault light shall go off when the inverter runs normally.

3） When an error occurs in communication, the fault light and the running

light shall flicker at the same time.

4） When other fault occurs, the fault light shall come on until the fault is removed.

5） The running light shall be on as long as the inverter is running properly.

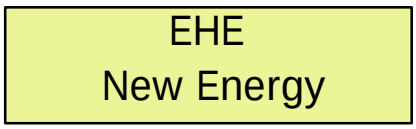
8.2 Function of Push-Button

After the system is powered on, the LCD screen display boot screen at first, then display initialize screen（see screen 1&2 below）. Then, press the button and hold it untill the LCD screen become "screen 3"（see screen 3 below）, can reset the cumulative generating time and cumulative generating capacity. When "screen 9" is end， press the buttons shortly to view the LCD screen display and press the button shortly and continuously to scroll the screen displays rapidly.

8.3 LCD Screen Display

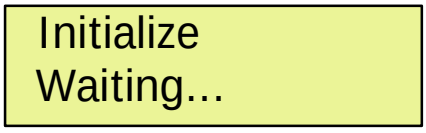
8.3.1 Initialization Interface

After the system is powered on, about 10 seconds later, the three indicator lights come on simultaneously and the boot screen displays as follows.



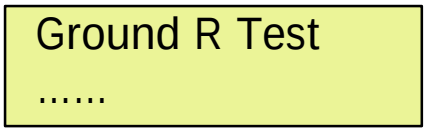
Screen 1 Boot screen

Then the system initializes and displays the follow screen. When the screen display is over, the running and the fault indicator lights go out at the same time.



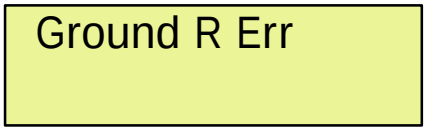
Screen 2 System initialize screen

Then display the Screen 3：



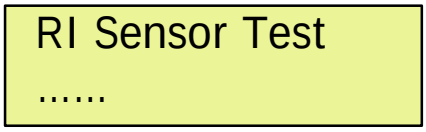
Screen 3 Grounding resistance testing screen

If the grounding resistance fault, then display the Screen 4：



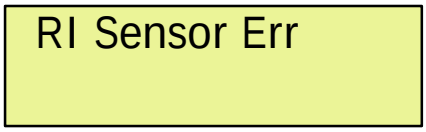
Screen 4 Grounding resistance fault

If there is no grounding resistance fault, then display the Screen 5：



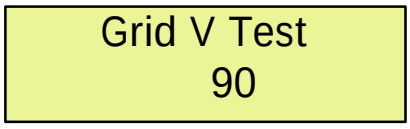
Screen 5 AC leakage current sensor testing screen

If the AC leakage current sensor fault, then display the Screen 6：



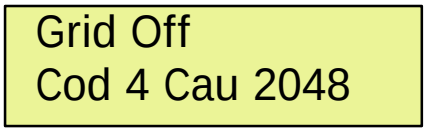
Screen 6 AC leakage current sensor fault

If there is no AC leakage current sensor fault, then display the Screen 7, the inverter is in grid state testing, countdown from 90 to 60, in about 30s.



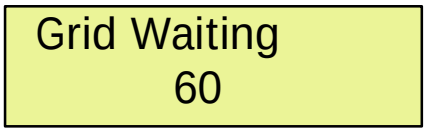
Screen 7 The grid voltage testing screen

If the grid voltage loss, then display the Screen 8, Wherein “Cod “ represents shutdown code, “Cau “ represents shutdown reason.



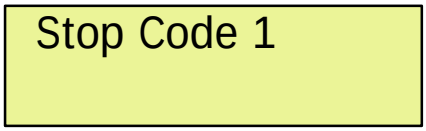
Screen 8 The grid voltage loss

If the grid voltage is normal, the Inverter entered the countdown state, 60、 59、 … 3、 2、 1、 0, and display the Screen 9：

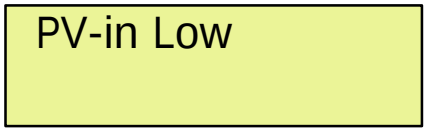


Screen 9 The countdown screen

Note that during the initialization interface start-up, if have fault, display the Screen 10; If the PV voltage fail to meet the start condition, then display the Screen 11.

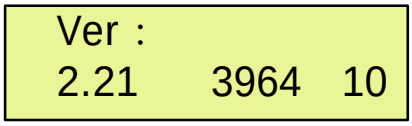


Screen 10 Fault screen



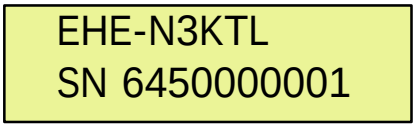
Screen 11 The PV voltage low

After the system initialize screens display completed, the equipment version information shall be displayed subsequently, including "2.21" indicating the LCD version No., "3964" indicating the version No. of inverter and “10" indicating the ID No. the program updates, they also follow to update.



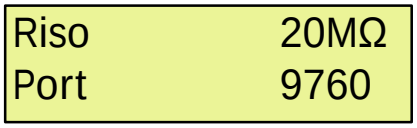
Screen 12 Version No. screen

If the communication is normal, the equipment model and serial No. shall be displayed subsequently, the screen shall be displayed as follows (the EHE-N3KTL model is taken as an example):



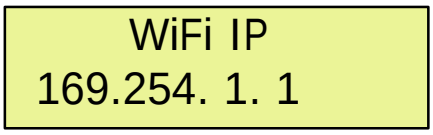
Screen 13 The equipment model and serial No. screen

As Screen 14, if the inverter have DC bus ground fault, the Riso is “0”, otherwise the Riso is “20”. The Port is port number, if use WiFi communication, the default value of Port is “9760”, if not , the Port is “0”. The port number can be modified through webpage, how to modify please refer to the “WiEi communication user manual”.



Screen 14 Grounding fault of DC bus screen

Screen 15 shows IP address, if use WiFi communication, the value of WiFi IP is the actual allocated IP address, if not , the WiFi IP is “0.0.0.0”.

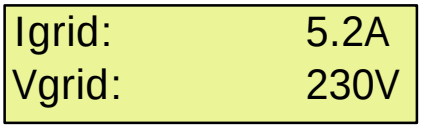


Screen 15 WiFi IP address

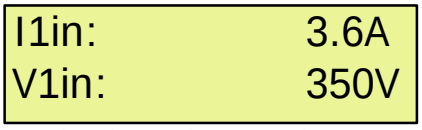
8.3.2 Screen Display of Operating Parameters

After screen 15 appears about 2 seconds, the following 7 screens shall be displayed in turn (screen 16 to screen 24). Each screen displays about 10 seconds.

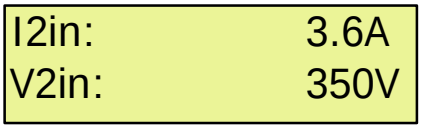
Screen 16 Temperature and operating status information



Screen 17 Grid current and voltage information



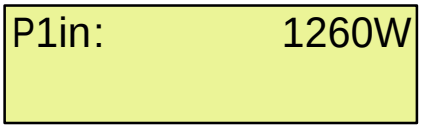
Screen 18 Current and voltage information of PV array1



Screen 19 Current and voltage information of PV array2

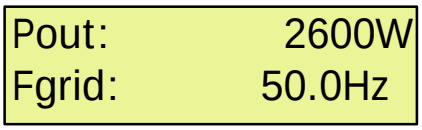
For EHE-N1K5TL /EHE-N2KTL inverters, screen 19 shall not be displayed.

Screen 20 Input power information

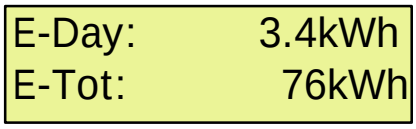


Screen 21 Input power information

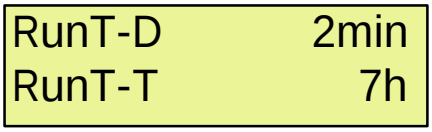
For EHE-N1K5TL/EHE-N2KTL inverters, screen 20 shall not be displayed on LCD screen, but screen 21.
For EHE-N3KTL/EHE-N4KTL/EHE-N4K6TL inverters, screen 21 shall not be displayed on LCD screen, but screen 20.



Screen 22 Output information

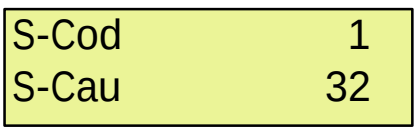


Screen 23 Daily power and cumulative power information



Screen 24 Daily time and cumulative time information

If no button is pressed, and no fault, the screen shall return to screen 16 display and the above cycle shall continue. If the button is pressed, the screen shall return to screen 12 and the above cycle shall continue.
If have fault, the inverter shall stop running and display screen 25. S-Cod is outage code, S-Cau is the reason for outage.

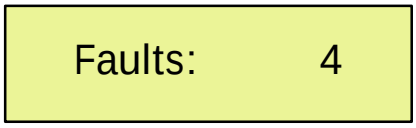


Screen 25 Outage reason inquires screen

Note that during the Inverter is running normally, the PV voltage is low or the grid voltage is loss, and then will display the Screen 11 or the Screen 8.
If have any other faults, please see the Screen 25.

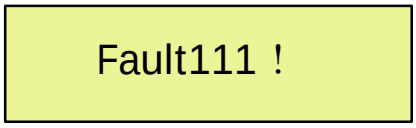
8.3.3 Fault-Screen Display

When severel faults occur, e.g. four faults, the screen shall display the follow screen after Screen 24 or Screen 25.

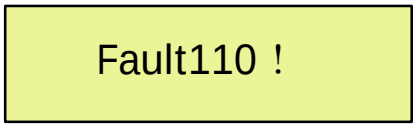


Screen 26 Fault advisary display

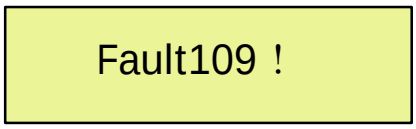
If no button is pressed, the screen shall display as Screen 26; if the button is pressed (shortly and continuously), the screen shall display four faults in turn, and then continue the process of above cycle so that the user can inquire about the necessary information for troubleshooting. When the button is released, there is still fault that finally remains as screen 26 displays. When the faults are removed, the display returns to nomal and repeats the above process.
The specific fault is shown as follows:



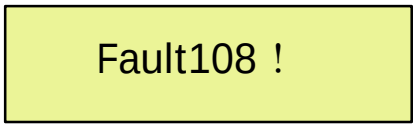
Screen 27 Fault screen



Screen 28 Fault screen



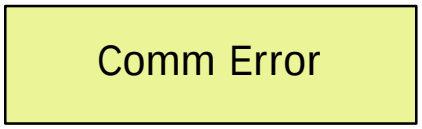
Screen 29 Fault screen



Screen 30 Fault screen

Note that if a communication error occurs, no matter what displays on the

current LCD screen, a fault tip will pop up and displays until the communication error disappears, then the fault indicator light flashes. If the button is pressed shortly at this time, shall view every LCD screen display. Then release button, the screen remain displays the screen as follows:



Screen 31 Communication error

Table 8-2 below lists the cross-reference of fault susplays:

Table 8-2 Cross Reference of Fault Displays

Name of Fault	Screen Display
Radiator overheating	Fault100 !
Temperature switch fault	Fault101 !
Array 1 over-current	Fault102 !
Array 2 over-current	Fault103 !
AC hard over-current	Fault104 !
Drive over-current	Fault105 !
Grid-connection over-current	Fault106 !
Inverter amplitude error	Fault107 !
Synchronous phase error	Fault108 !
Grid phase loss	Fault109 !
Grid frequency error	Fault110 !
Grid amplitude error	Fault111 !
Communication fault, RXD off-line	Fault112 !
Communication fault, TXD off-line	Fault113 !
DC bus undervoltage	Fault114 !
Temperature sensor fault	Fault115 !
Slave equipment initialization error	Fault200 !
DC soft over-voltage	Fault201 !
Array 1 over-voltage	Fault202 !
Array 2 over-voltage	Fault203 !
Capacitance neutral-point voltage fault	Fault204 !
DC bus ground fault	Fault205 !
AC leakage current sensor fault	Fault206 !
AC leakage current out-of-limit fault	Fault207 !
AC leakage current mutation fault	Fault208 !
The disequilibrium between AC sensor A and B	Fault209 !
AC sensor A failure	Fault210 !
AC sensor B failure	Fault211 !

Array 1 current sensor fault	Fault212 !
Array 2 current sensor fault	Fault213 !
The DC component over load of IA	Fault214 !
The DC component over load of IB	Fault215 !
The zero calibration fault of IA	Fault300 !
The zero calibration fault of IB	Fault301 !
Parallel arrays off-line	Fault302 !

8.4 LCD Screen Backlight Control

When the power is on, the LCD backlight shall come on and the initialization is completed. When the inverter operates normally about 10 seconds, the backlight will go out. If the button is pressed, the backlight shall come on. If no button is pressed for 30 seconds, the backlight shall go out.

8.5 Statistics of Total Generating Capacity and Time

The total generating capacity statistics include the total daily generating capacity and total cumulative generating capacity. The total daily generating capacity is calculated from 0 after restarting the inverter.
The total generating time statistics include the total daily generating time and the total cumulative generating time. The total daily generating time is calculated from 0 after restarting the inverter. The total generating time measurement will be accumulated after installation.

9 Troubleshooting

9.1 Troubles and Processing

Once a fault occurs, the fault light comes on, the LCD screen displays the current fault and at the same time, the inverter will be shut down. The following table lists the typical faults and corrective measures.

Table 9-1 List of Troubleshooting

Content of Fault	Fault Description and Troubleshooting
Grid frequency error （Fault110！）	The grid frequency exceeds the allowable limits. Once the grid frequency returns to normal, the inverter will recover grid-connected operation after five minutes.
	• Check the grid for proper connection. • Check the grid for stable frequency.
Grid amplitude error （ Fault111！）	Grid voltage exceeds permitted range. Once grid voltage re-normal, inverter will recover running after over five minutes.
	• Check the grid for proper connection. • Check the grid for stable voltage.
Grid phase loss （ Fault109！）	Grid phase loss
	• Check the grid for normal wiring. • If this fault occurs frequently, please contact Anhui EHE New Energy Tech. Co., Ltd.
Grid-connection over-current （Fault106！）	The grid-side current exceeds the allowable limit
	• Check the grid wiring for short circuit, check the inverter for interference sources nearby, if not, please restart the inverter. • If this fault occurs frequently, please contact Anhui EHE New Energy Tech. Co., Ltd.
Array 1 over-voltage （ Fault202！）	The first input voltage at DC side is overhigh
	• Operate the DC circuit breaker, disconnect the PV component from the inverter immediately. • Measure the PV array open-circuit voltage.

	• Check that the connection mode of PV component meets the inverter requirement.
Array 2 over-voltage （ Fault203！）	The second input voltage at DC side is overhigh
	• Operate the DC circuit breaker, disconnect the PV component from the inverter immediately. • Measure the PV array open-circuit voltage. • Check that the connection mode of PV component meets the inverter requirement.
Array 1 over-current （ Fault102！）	The first input current at DC side is overhigh
	• Operate the DC circuit breaker, disconnect the PV component from the inverter immediately. • Check that the connection mode of PV component meets the inverter requirement.
Array 2 over-current （ Fault103！）	The second input current at DC side is overhigh
	• Operate the DC circuit breaker, disconnect the PV component from the inverter immediately. • Check that the connection mode of PV component meets the inverter requirement.
AC leakage current sensor fault (Fault206！)	AC leakage current sensor failure
	• When inverter is starting or running， this fault occurs, please restart the inverter. • If this fault occurs frequently, please contact Anhui EHE New Energy Tech. Co., Ltd.

10 Appendix A

Technical Data EHE-N TL

Model / Data	EHE-N1K5TL	EHE-N2KTL	EHE-N3KTL	EHE-N4KTL	EHE-N4K6TL
PV input quantities:					
Max PV Power	1650W	2200W	3300W	4400W	5060W
Max PV Voltage	520V				
Isc PV Current	12.5A	16.25A	2*12.5A	2*16.25A	2*16.25A
Max Input Current	1×10A	1×13A	2×10A	2×13A	2×13A
Number of String	1		2		
Number of MPPT	1		2		
MPP Voltage Range	125V-420VDC	125V-420VDC	125V-420VDC	125V-420VDC	150V-420VDC
MPPT efficiency	>99%				
PV Start Voltage	180 VDC	180 VDC	180 VDC	180 VDC	180 VDC
Nominal Input Voltage range	165-420 VDC	165-420 VDC	165-420 VDC	185-420 VDC	185-420 VDC
Max Inverter Backfeed Current to the Array	0A				
AC output quantities:					
Power	1.5kW	2kW	3kW	4kW	4.6kW
Nominal output current (at 230 VAC)	6.5A	8.7A	13A	17.4A	20A
Max. output current	6.9A	10A	15A	20A	23A
Operating Grid Frequency	49.5 Hz～50.2Hz				
Operating Grid Voltage	230VAC				
Current	< 3%				

THD(at nominal output power))					
Power Factor(at nominal output power))	＞ 0.99				
Max Efficiency	96.50%	96.50%	96.80%	97.00%	97.00%
European Efficiency	95.50%	95.50%	95.80%	96.00%	96.00%
Standby Power	< 7W				
Nighttime Power Consumption	0.5W				
Grid monitoring	VDE0126-1-1				
Mechanical					
Dimensions (W × H × D) (approx.)	325×475×170mm		325×535×190mm		
Weight (approx.)	14kg	14.5kg	18kg	18.5kg	19kg
Conditions and safety					
Isolation	Transformerless				
Personal protection	Insulation monitoring , integrated all-pole sensitive leakage current monitoring unit				
Protective Class	I				
Ingress protection	IP65				
Cooling	Natural				
Ambient Temperature Rating	-25 to + 60°C	-25 to + 60°C	-25 to + 60°C	-25 to + 60°C	-25 to + 60°C (@45°C derated)
Data logger Data communication interface	RS485（RS232 ,WiFi optional）				
Altitude	2000m ; above 2000m need derate operating				
Noise emission	＜45dB				

Compliance	IEC 62103; EN 50178; IEC/EN 62109-1;IEC/EN 62109-2; IEC/EN61000-6-1:2007;IEC/EN61000-6-3:2007; IEC/EN61000-3-3 :2007;AS/NZS 3100: 2009; AS4777.2: 2005; AS4777.3: 2005;

11 Appendix B

11.1 Quality Assurance

- **Warranty Period**

The warranty period of the product is five years, and the contract shall prevail if otherwise specified in the contract.

- **Evidence**

In the warranty period, the company requires customers to show the product purchase invoice and purchase date. At the same time, the mark on the product should be clearly visible otherwise the company has right to refuse to give quality assurance.

- **Conditions**
- The product found failure during warranty period, Anhui EHE New Energy Tech. Co., Ltd. will, free of charge, repair or replace it with new product.
- The failed product replaced should be returned to Anhui EHE New Energy Tech. Co., Ltd.
- The client should give reasonable time for Anhui EHE New Energy to repair the faulty equipment.

When one of the following cases exists, the company has the right to refuse to give quality assurance:

- Transportation damage.
- Improper installation.
- Improper modifications.
- Incorrect use or inappropriate operation
- Operated in a harsh ambient environment beyond the conditions described in this manual.
- Damage caused due to abnormal natural environment.
- If the product size and parameters have changed, the latest information given by the company shall prevail without notice.

11.2 Contact Us

If you have any question about EHE-N single-phase photovoltaic grid-connected inverter, please contact us, and we will be happy to give you answers